

LOUISIANA DEPARTMENT OF NATURAL RESOURCES
OFFICE OF CONSERVATION
RADIOACTIVE TRACER GUIDELINES AND PROCEDURES
for Annular Saltwater Disposal Wells

The purpose of running a radioactive tracer survey (RTS) in an annular disposal well is threefold:

1. To show whether injected fluids will leak through a hole or holes in the casing above the casing shoe; and
2. To show whether injected fluids will migrate vertically outside the casing after reaching the casing shoe; and
3. To show whether the well can be successfully operated within the calculated Maximum Allowable Surface Injection Pressure (MASIP).

GUIDELINES:

- A. All injection must occur at or below the calculated Maximum Allowable Surface Injection Pressure (MASIP). An RTS run at pressures above the MASIP will result in denial of the annular saltwater disposal application.
- B. Indicate injection pressures required to displace the radioactive slug between log passes.
- C. Indicate volume of water injected between log passes.
- D. Indicate injection rate between log passes.
- E. The gamma-ray log may be run up to 60 ft/min at a Time Constant of 1 second (suggested) or up to 30 ft/min at Time Constant 2 or up to 15 ft/min at Time Constant 4. Indicate logging speed and Time Constant on the log heading.
- F. Include a collar locator for depth control.
- G. Vertical scale may be 2" or 5" per 100 ft; 2" being preferred.
- H. Indicate the horizontal scale in API units. It is suggested that two gamma-ray curves at different sensitivities (such as one at 20 API units per division and one at 100 API units per division) be recorded on each log pass. If only one gamma-ray curve is recorded, make sure the sensitivity used is such that the tracer material will be obvious when detected and will not be confused with normal "hot spots" in the formations; i.e., choose a low sensitivity. It need not be sensitive enough to show lithology.
- I. Indicate beginning and ending clock times on each log pass.
- J. Indicate volume and concentration of each slug of tracer material.

If preferred, most of the above may be shown in tabular form rather than on the log, as long as all information is provided (the Injection & Mining Division will provide forms on request).

PROCEDURES:

1. Run a base log from at least 200 feet below the casing shoe to the surface.
2. Pump tracer material, either liquid or water soluble Iodine 131 (normally 10 millicurie), into the annular space and trace the slug with the gamma-ray tool. Run short (approximately 500 ft) overlapping log passes while following the tracer downhole. Each pass should extend from about 100 ft below the base of the slug to at least 25 ft above the top of the previously recorded slug depth. (Above the point where the gamma ray count returned to baseline levels on previous run) An ideal sequence would be something like:

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place gamma-ray tool at 475 ft;

- a) pump tracer down until detected by the tool;
- b) log from 600 ft to the surface (slug discovered at 425-500 ft);
- c) place tool at 975 ft;
- d) pump tracer down until detected by tool;
- e) log from 1100 ft to 400 ft (25 ft above top of previous slug!)
- f) place tool at 1475 ft;
- g) pump tracer down until detected by tool;
- h) log from 1600 ft to 900 ft (at least 25 ft above top of previous slug!)

This logging procedure should continue at approximate 500 ft increments (assuming no tracer was previously left behind). Do not pump during logging; that is, pump only to move tracer down hole between log passes. Be cautious of the volume of water pumped during or between log passes to prevent premature loss of the tracer! If the tracer has been prematurely lost, it will be necessary to pump away the slug, inject another slug and follow it from the point of the last good log pass. As soon as the tracer reaches the casing shoe, stop pumping and run a log to the surface. The volumes of fluid pumped between passes after the slug has reached the surface casing shoe must be consistent with the volumes pumped between previous passes. Do not inject a large volume of fluid to “pump away” the slug.

- 3. As tracer is pumped out of the casing into the well bore, run a few short passes from at least 50 ft below the slug depth to at least 100 ft above the slug showing the pathway the tracer follows. Continue running passes until the tracer virtually disappears. The last pass should essentially duplicate the base log.
- 4. Another log may be run to the surface after Step 4. This should be done particularly if the log run in Step 3 still shows “hot spots” due to leaks or to pipe scaling entrapping some of the tracer material.
- 5. Each pass must be submitted on a separate log segment with collar locator. A merged log may be submitted in addition to the separate log passes.
- 6. An interpretation of the log must be supplied by the logging company on the log itself.
- 7. Include a schematic diagram of the well on the log itself. The diagram should show the casing diameters and depths, tubing diameter and depth (if any), perforated intervals, and total or plugged back depth.
- 8. Write the Serial Number of the well on the log heading, if available.

NOTE: The above “Guidelines and Procedures” will apply in most instances. In certain situations, it will be necessary to deviate from these directions. Deep wells will probably need a concentrated slug in order to show integrity along the entire length of casing. Necessary modifications may be made as long as the three purposes stated at the top can be demonstrated. For questions, call 225/342-5515 weekdays.

Send two copies of the complete log to:

Office of Conservation
Injection & Mining Division
P.O. Box 94275
Baton Rouge, LA 70804-9275